Center Independent Research & Development: GSFC IRAD

NIR Detector Signal Chain Development

Completed Technology Project (2011 - 2013)

Project Introduction

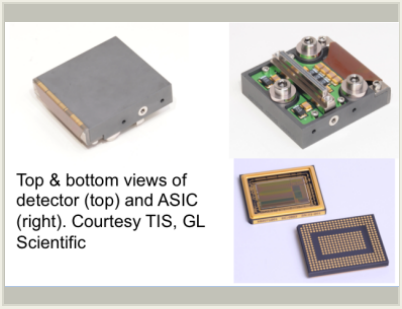
The NIR Detector Signal Chain Development project proposes to develop the front end of the signal chain for Near Infrared (NIR) detector systems based on Teledyne's HxRG multiplexers and SIDECAR application-specific integrated circuits (ASIC). The development work includes both development of guide-mode software for the ASIC, and development of sample-up-the-ramp processing software for on-board detector non-linearity correction and cosmic-ray rejection.

The objectives of this proposal are twofold: 1) develop a suite of flight software tools for utilizing the advanced capabilities inherent in the guide-mode features of the present generation of near-infrared detectors, and 2) develop an implementation of sample-up-the-ramp processing for NIR detector readouts that gracefully handles signal saturation and cosmic-ray hits during an exposure. The objectives of the guide mode software development are to learn how to generate optimal clocking sequences for interleaving rapid readout of multiple guide windows with slower readout of science data from the rest of the detector, and to develop software to implement these sequences in the SIDECAR™ ASIC for use in flight applications.

Anticipated Benefits

A mission that is already funded is unlikely to benefit from this work, as a satisfactory detector electronics concept was presumably established in the approved mission baseline.

However, it is conceivable that such a mission might benefit in a scenario where this work enabled the descope of a dedicated Fine Guidance Sensor, possibly saving cost and schedule resources.



Top & bottom views of detector (top) and ASIC (right). Courtesy TIS, GL Scientific

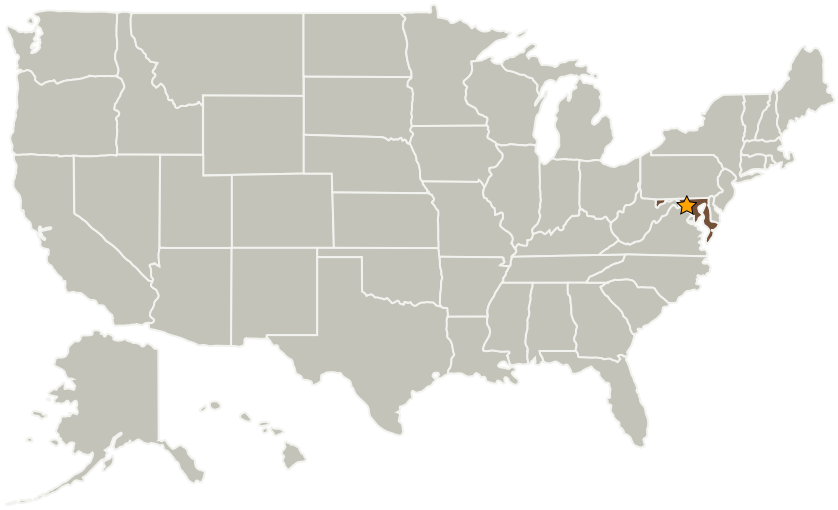
Enhancing GSFC NIR Detector Capablities: Guide Mode Software

Table of Contents

NIR Detector Signal Chain Development

Completed Technology Project (2011 - 2013)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

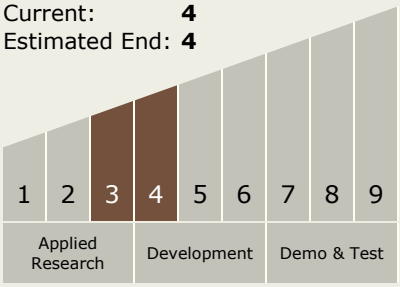
Stanley D Hunter

Principal Investigator:

Jeffrey W Kruk

Technology Maturity (TRL)

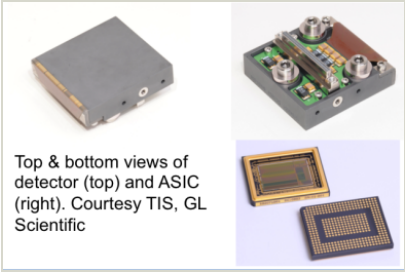
Start: **3**
Current: **4**
Estimated End: **4**



NIR Detector Signal Chain Development

Completed Technology Project (2011 - 2013)

Images



NIR Detector Signal Chain Development Project
Enhancing GSFC NIR Detector Capablities: Guide Mode Software *(https://techport.nasa.gov/image/2566)*

Project Website:

http://sciences.gsfc.nasa.gov/sed/

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes